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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

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Please find below and/or attached an Office communication concerning this application or proceeding.

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# Office Action Summary

Application No.  
09/632,348

Applicant(s)  
Hiromitsu TANAKA et al.

Examiner  
M. Yamnitzky

Art Unit  
1774



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three (3) MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1) ☒ Responsive to communication(s) filed on Aug 3, 2000

2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

4) ☒ Claim(s) 1-13 is/are pending in the application.

4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 1-13 is/are rejected.

7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.

8) ☒ Claims 1-13 are subject to restriction and/or election requirement.

## Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☒ All b) ☐ Some\* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2

18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other:

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1. This application contains claims directed to the following patentably distinct species of the claimed invention: the different condensed ring compound derivatives provided by individual ones of the structures represented by formulae (a) to (l) as shown in claim 4 wherein each R is individually selected from the functional units represented by one of formulae (r1) to (r22) as shown in claim 5 or a substituted derivative thereof.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 1 and 3-6 are generic. Election of a single disclosed species requires election of one of (a) to (l) and one or two of (r1) to (r22).

In addition, applicant is required to identify an ultimate species that will be used as the starting point for search and examination purposes. For example, compound (18) on page 42 of the specification is an ultimate species of (d)(r3)(r3).

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

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Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. During a telephone conversation with Tom Barnes on 02/21/02 a provisional election was made with traverse to prosecute the invention of species (d)(r18)(r18). (The election requirement was initially discussed with Mr. Barnes on 02/04/02.) The compound of formula (a7) as shown in claim 13 was selected as the ultimate species. Affirmation of this election must be made by applicant in replying to this Office action. All claims read on the elected species.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

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4. The disclosure is objected to because of the following "informalities":

The top margin on each of pages 5, 6 and 8 is too small, resulting in the inadvertent deletion of portions of text on page 5 and portions of formulae on pages 6 and 8 when holes were made in the application papers for assembly in the application file. Replacement pages for pages 5, 6 and 8, having a minimum 3/4" top margin, are required. See MPEP 608.01 and 37 CFR 1.52.

Lines 17-18 on page 11 refer to formulae (a1)-(a13) as representing adamantane derivatives but formula (a12) is not the formula of an adamantane derivative.

The specification sets forth various examples of "aromatic compounds" that are not aromatic. In particular, see the last two lines on page 8 and lines 14-15 on page 28.

The name set forth in lines 8-9 on page 56 for compound 27 does not correspond to the formula for compound 27 as set forth on page 57.

Appropriate correction is required.

5. Claims 1-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "at least one said organic compound layer is a condensed ring compound derivative" and claim 7 recites "at least one said organic compound layer is an adamantane derivative" (emphasis added). The use of the term "is" in these phrases is confusing. It is not

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clear if the term “is” requires that the at least one layer “consist of” the specified derivative, or if it is sufficient for the at least one layer to “comprise” the derivative.

It is not clear what is meant by “directly combined or 2-functional substituents” as recited in claim 1.

The use of the term “and” in the definition of R1 and R2 as set forth in claim 1 and in the definition of Ar1 and Ar2 as set forth in claim 7 is confusing in light of the dependent claims. While the independent claims require these variables to represent functional units with/having “hole transporting ability, luminescence, and electron transporting ability” (emphasis added), the dependent claims encompass functional units that do not possess all three of these functions. For example, the functional unit of formula (r1) as shown in claim 5 is known to have hole transporting ability, but is not conventionally considered to be luminescent or to have electron transporting ability. Clarification of the claim language is required. (For purposes of comparing to the prior art, the examiner will interpret the claims as if “and” in the last line of claims 1 and 7 reads --and/or--.)

The scope of a “derivative” as recited in claim 2 is unclear. It is not clear if the term “derivative” is to be read only in conjunction with “oxadiazole”, or if the term also applies to “triphenylamine” and “coumarin”. Regardless of whether “derivative” applies only to oxadiazole or to all three named compounds, it is not clear what constitutes a “derivative” within the scope of R1 and R2.

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The structure of the claimed electroluminescent element according to claims 3 and 8 is unclear. It is not clear if “host materials” (emphasis added) requires more than one host material. In requiring the host materials to be “layered in said organic compound layer”, it is not clear if the organic compound layer is made up of one or more sublayers of host material(s) alternating with one or more sublayers of condensed ring compound derivative (in the case of claim 3) or alternating with one or more sublayers of adamantane derivative (in the case of claim 8). Alternatively, would one or more layers of the specified derivative mixed with host material(s) meet the limitations of claims 3 and 8?

In claim 5, it is not clear which of the two lines of formula (r8) indicates the bond position of the functional unit to the rest of the compound structure. That is, is the functional unit bonded to the rest of the compound structure via the nitrogen or via the heterocyclic ring?

Claim 5 is confusing in allowing the variables “n”, “m” and “i” to represent “integers” because zero and negative whole numbers are integers. It is not clear if the portions of the formulae having a subscript including one of these variables must actually be present.

In claim 5, the structure of formulae (r18) and (r19) is not clear. In addition to the confusion created by the definition of the variables “n” and “i” as noted above, it is not clear how many of “ $R_1$ ,  $R_2$ ,  $R_{n-1}$  and  $R_n$ ” in the case of formula (r18) and “ $R_1$ ,  $R_2$ ,  $R_i$ ,  $R_{n-1}$  or  $R_n$ ” in the case of formula (r19) must actually be present.

Claims 5 and 6 define “R” but do not define “ $R_1$ ,  $R_2$ ,  $R_i$ ,  $R_{n-1}$  or  $R_n$ ”. It is not clear if the definition of “R” also pertains to  $R_1$ ,  $R_2$ ,  $R_i$ ,  $R_{n-1}$  or  $R_n$ . (For purposes of comparing to the prior

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art, the examiner will interpret claims 5 and 6 as if the definition of “R” also pertains to each R that is followed by a subscript.)

The penultimate line of claim 5 recites “an isomer thereof”. It is not clear what this refers to. It is not clear what type of isomer is encompassed by this terminology. If “an isomer thereof” refers to isomers of saturated hydrocarbons having 1 to 30 carbons, the examiner notes that the structure of the saturated hydrocarbons is not limited so it is not clear what would be encompassed by “isomers thereof” that is not encompassed by “saturated hydrocarbon from C1 through C30”. For example, n-butyl, t-butyl and i-butyl are isomers of each other and are all within the scope of a C1-C30 saturated hydrocarbon.

Claim 5’s definition of R as an aromatic compound is confusing in light of the various members of the Markush group set forth in claim 6 that are not aromatic groups. In particular, see the last two lines of claim 6. It is not clear how applicants are using the term “aromatic”. It is not clear what other non-aromatic groups might be within the scope of R as an aromatic group.

It is not clear if claim 6 is defining a required compound or an optional compound. In other words, it is not clear if the condensed ring compound required by claim 6 must contain functional units having a formula set forth in claim 5 that contains R and further wherein R must represent an aromatic compound. For example, would a condensed ring compound wherein each functional unit is represented by formula (r1) be outside the scope of claim 6? Would a condensed ring compound wherein each functional unit is represented by formula (r20) wherein R of formula (r20) represents a methyl group be outside the scope of claim 6?



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The Markush group set forth in claim 6 is supposed to limit an "aromatic compound" but the possibilities set forth in the last two lines of the claim are not aromatic groups. As pertains to "R" without a subscript, the possibilities set forth in the last two lines of claim 6 are also unclear because the formulae in claim 5 which contain "R" without a subscript would require a univalent group as "R". In contrast, the penultimate line of claim 6 sets forth what appears to be two tetravalent radicals and one trivalent radical, with the remainder of the radicals in the last two lines being divalent.

Presuming the definition of "R" also pertains to each R that is followed by a subscript, then the use of the suffix "-yl" for various possibilities within the scope of "R" as defined in claim 6 is confusing because at least some of the R's with subscripts would be divalent rather than univalent, and R<sub>1</sub> in (r18) appears to be required to be trivalent. It is also not clear how the two tetravalent radicals set forth in the last two lines of claim 6 could be represented by any of the R's with subscripts.

The definition of "R" as set forth in claim 6 is also rendered indefinite by the Markush group members "-N(R)-", "-Si(R<sub>2</sub>)-" and "-B(R)-" because, with these three group members, "R" may never be fully defined (in the instances where each R within these three group members is also one of these three group members).

Claims 9 and 12 do not utilize proper Markush language in reciting a functional group "selected from a group of". The term --consisting-- should be inserted between "group" and "of".

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While claim 7 defines R1 through R8 as representing “substituents”, it is apparent from the species claimed in dependent claim 13 that at least some of the “substituents” represented by R1 through R8 may actually be hydrogen atoms. It is not clear if claim 9, in reciting “each of said substituents R1 through R8 is...selected from...”, is excluding compounds in which one or more of R1 through R8 represents hydrogen.

The penultimate line of claims 9 and 12 recites “halogen group”. The scope of a “halogen group” is not clear. It is not certain if this allows for any group containing a halogen atom, or if this is limited to halogen atoms.

Claim 10, with claims 11 and 12 dependent therefrom, requires Ar1 and Ar2 to have an aryl skeleton as a “basic skeleton”. The limitations imposed by this requirement are not clear. In particular, it is not clear if this language requires a carbon of an aryl group to be directly attached to the benzene ring where Ar1 and Ar2 are shown in the formula. For example, are compounds of formulae (a1)-(a4) as shown in claim 13, wherein a nitrogen is directly attached to the benzene ring where Ar1 and Ar 2 are shown in claim 7’s formula, outside the scope of claims 10 and 11?

Claim 13 is confusing as dependent from claim 7 because chemical formula (a12) is not an adamantane derivative.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 2, 4-7 and 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki et al. (US 5,420,351).

This rejection is made subject to clarification of the limitations of the claims as questioned in the rejection under 35 U.S.C. 112, second paragraph.

Regarding claim interpretation, the examiner notes that while claim 1 defines A1 and A2 as representing "substituents", the chemical formulae set forth in dependent claim 4 show that these "substituents" may actually be hydrogen atoms. Similarly, while claim 7 defines R1 through R8 as representing "substituents", the species set forth in dependent claim 13 show that at least some of these "substituents" may actually be hydrogen atoms.)

See the whole patent. In particular, see column 2, line 65 - c. 3, l. 24, c. 5, l. 14-35, c. 5, l. 60 - c. 6, l. 10 and c. 6, l. 48 - c. 7, l. 32.

The EL device described in the prior art Reference Example (c. 6-7) meets the limitations of the electroluminescent element of claims 1, 2 and 4-6 wherein the condensed ring compound derivative has a structure represented by formula (d) as shown in claim 4 wherein each R represents a functional unit with hole transporting ability, specifically, wherein each R represents triphenylamine having a structure represented by formula (r1) as shown in claim 5. This prior art device also meets the limitations of a device of claims 1, 2 and 4-6 wherein the condensed ring compound derivative has a structure represented by formula (d) wherein each R represents a functional unit having a structure represented by formula (r18) wherein R<sub>1</sub> represents a phenylene,

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R<sub>2</sub> represents -N(R)- with the R of -N(R)- representing a phenyl, n represents 3 and R<sub>3</sub> represents phenyl.

The EL device described in the prior art Reference Example (c. 6-7) also meets the limitations of the electroluminescent element of claims 7 and 10-12 wherein, in the adamantane derivative of the formula set forth in claim 7, each of R1 through R8 represents hydrogen, and each of Ar1 and Ar2 represents a diphenylamino group in which each phenyl of the diphenylamino groups may be further substituted.

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 9 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (5,420,351) as applied to claims 1, 2, 4-7 and 10-12 above, and for the further reasons set forth below.

The adamantane compounds disclosed by Suzuki et al. are compounds having the formula set forth in claim 7 wherein each of R1 through R8 represents hydrogen. The compounds of formula (a1)-(a6) in claim 13 are similar compounds in which some of R1 through R8 represent

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something other than hydrogen. Claim 9 also encompasses compounds similar to the prior art compounds but (appear to) require each of R1 to R8 to be something other than hydrogen.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make adamantane compounds similar in structure to the adamantane compounds of Suzuki et al. with the expectation that compounds similar in structure to Suzuki's compounds would have similar properties and could be used for the same purpose as Suzuki's compounds. One of ordinary skill in the art would have been motivated to make adamantane compounds similar in structure to Suzuki's compounds in order to provide other adamantane compounds have hole transporting properties that would be useful in an organic electroluminescent device as taught by Suzuki et al.

10. Miscellaneous:

In the first line of claim 6, "whrein" should read --wherein--.

In the fourth line of claim 9, the examiner suggests that "hydroxyl" be changed to --hydroxy-- because, technically, "hydroxyl" refers to an -OH group in an inorganic compound whereas "hydroxy" refers to an -OH group in an organic compound.

11. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure.

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WO 99/19419 discloses condensed ring compounds that are similar to, but outside the scope of, the condensed ring compounds encompassed by the present claims. For example, see the formulae on pages 8-11 of the prior art.

WO 00/03565 discloses adamantane compounds for use in organic EL devices (e.g. see page 9). However, these adamantane compounds are outside the scope of the adamantane compounds encompassed by the present claims.

Mori et al. (5,281,489) may be relevant to the subject matter of present claims 3 and 8. These two claims are currently too unclear as to make a meaningful prior art rejection. If these claims merely require multiple layers of organic material, with at least one of the layers comprising the condensed ring compound derivative/adamantane derivative, Mori et al. is relevant as demonstrating that various organic EL device multi-layer structures were known in the art at the time of the invention. If these claims require at least one organic layer comprising a mixture of organic materials wherein at least one of the materials is the condensed ring compound derivative/adamantane derivative, Mori et al. is relevant as demonstrating that the use of a mixture of compounds in one or more layers of an organic EL device was known in the art at the time of the invention.

12. Patentable subject matter:

The prior art does not disclose or suggest an organic electroluminescent device comprising a pair of electrodes and, between the pair of electrodes, at least one organic layer

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comprising an adamantane derivative represented by one of formulae (a7)-(a11) and (a13) as shown in present claim 13.

13. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (703) 308-4413. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax numbers for Art Unit 1774 are (703) 872-9311 for official after final faxes and (703) 872-9310 or (703) 305-5408 for all other official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (703) 872-9041.)

MRY  
03/11/02

*Marie R. Yamnitzky*

MARIE YAMNITZKY  
PRIMARY EXAMINER

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